

Amendment Under 37 C.F.R. § 1.111
USSN 10/516,457

AMENDMENTS TO THE DRAWINGS

Attachment: 1 Replacement Sheet

REMARKS

Claims 1-13 and 15-19 now stand in the application, claim 14 having been canceled and new claim 19 added to recite subject matter previously in claim 2. Reconsideration of the application and allowance of all claims are respectfully requested.

Submitted herewith is an amended drawing as requested in paragraph (3) of the Office action.

The claims have been editorially amended as requested by the examiner in paragraph 7 of the Office action.

Regarding the rejection stated in paragraph 5, claim 14 has been canceled.

The rejection stated in paragraph 9 of the Office action is respectfully traversed.

The present invention seeks to prevent build-up of polymer deposits on interior surfaces of an etching reactor, and to this end uses a heater liner. At the top of page 5 of the application, applicant has acknowledged that it was known in the art to use a ceramic heater liner to reduce the formation of deposits on the walls of a deposition reactor. Applicant has pointed out at lines 9-12 of page 5 that such an arrangement is not suitable for an etching reactor. Thus, according to the invention, a heater liner of a suitable metal or alloy is used. As discussed in the paragraph bridging pages 5-6 of the specification, to be compatible with an alternating etching method, the first criteria for an appropriate metal or alloy would be metals or alloys that do not react with either the etching gas or the passivation gas to form volatile compounds, and a second criteria would be metals or alloys that do not emit contaminating atoms under plasma bombardment.

Bosch discloses the use of a liner 20 of interlocking ceramic, as discussed at lines 41-42 column 10, silicon and carbon (line 45 of col. 10). The liner 20 in Bosch is not of a metal or alloy. In the present invention, the heater liner is made of metal or alloy in order to improve the thermal function of the liner and thus to improve the reproducibility of the etching of the substrate, and also to avoid contamination of the substrate during the etching process. There is no suggestion in Bosch that a metal or alloy could be used for the liner element 20.

As to Wang et al. that reference discloses a deposition processing chamber (fig. 1b and paragraph 24), comprising shields (150), an annular deposition ring (390) and a covering ring (391) around the substrate, upper (392) and lower (394) gas shields, and a liner (395) adjacent to the sidewalls (130) which may cover a portion of the internal wall of the chamber. The shields (150) may be of aluminum, titanium, stainless steel and aluminum oxide.

If one of skill in the art were to consider Bosch and Wang et al, one might consider following the teaching of Wang et al to provide an aluminum, titanium, stainless steel or aluminum oxide liner element. But the artisan would not proceed with such a modification because the materials of the Wang et al liner are fine for deposition chambers but are inappropriate for an etching reactor. Thus, the combination proposed by the examiner would not have been made.

Further, Bosch et al. dissuade one from using a metal for the liner, Bosch teaching that it would be undesirable to have any aluminum in the liner because it can be destroyed by the etching beam and produce a contamination of the substrate (lines 47-49 of column 10). This phenomena cannot occur in a deposition chamber, thus aluminum may be used. But one reading the two references and seeing that Bosch is an etching reactor and seeing that Bosch explicitly

states that one should not use aluminum, would clearly not use the Wang et al liner material in the Bosch device.

In the present invention, a liner made of metal or alloy is used because the etching process is an alternating step method (see p.1, 1.11-14 of the application). The problem to be solved by the invention is the decrease of etching speed by using an alternate method. The solution is given for this method. Thus, the contamination of the substrate due to Al is less than in the etching process of Bosch et al. because the etching steps are short and are followed by a passivation step. Another reason of less contamination is an increase of homogeneity and reproducibility of thermal conditions by using the invention. It was the present inventors who first discovered the advantages and how to achieve them.

For these reasons, and in spite of Bosch teaching away from the invention, the liner of the present invention is a metal or an alloy.

Since Bosch does not teach the use of a metal or alloy for the liner, and since the use of Wang's liner material would not have been obvious because Wang is directed to a deposition chamber rather than an etching chamber so there would have been no reason to run counter to the direct teaching of Bosch that aluminum should be avoided, and since none of the other cited art give any reason to use a metal for the liner in place of the materials used in Bosch, the invention defined in claim 1 as well as all of its dependent claims is neither shown nor suggested in the prior art.

It is unnecessary to discuss further details of the dependent claims at this time.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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